
SOFIA
NASA
DLR
N747NA
NASA
850

SOFIA

Stratospheric Observatory For Infrared Astronomy

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AAS Basic Science Workshop

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Outline of Material

- Overview of SOFIA
- Science Capabilities

OVERVIEW

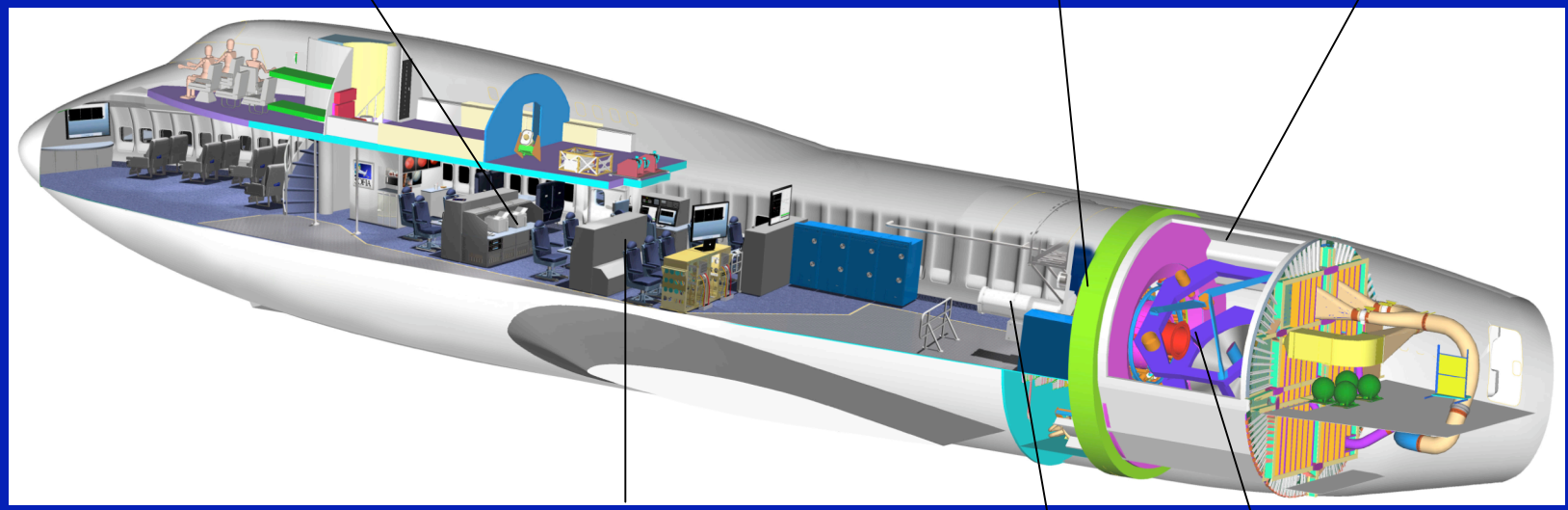
Overview of SOFIA

- SOFIA is 2.5 m telescope in a modified B747SP aircraft
  - Optical-mm performance
  - Can obtain obscured IR (30-300 μm), most important
- Joint Program between the US (80%) and Germany (20%)
- First Science 2009 (NASA, DLR, USRA, DSI)
- Designed for 20 year lifetime

Overview of SOFIA (Cont)

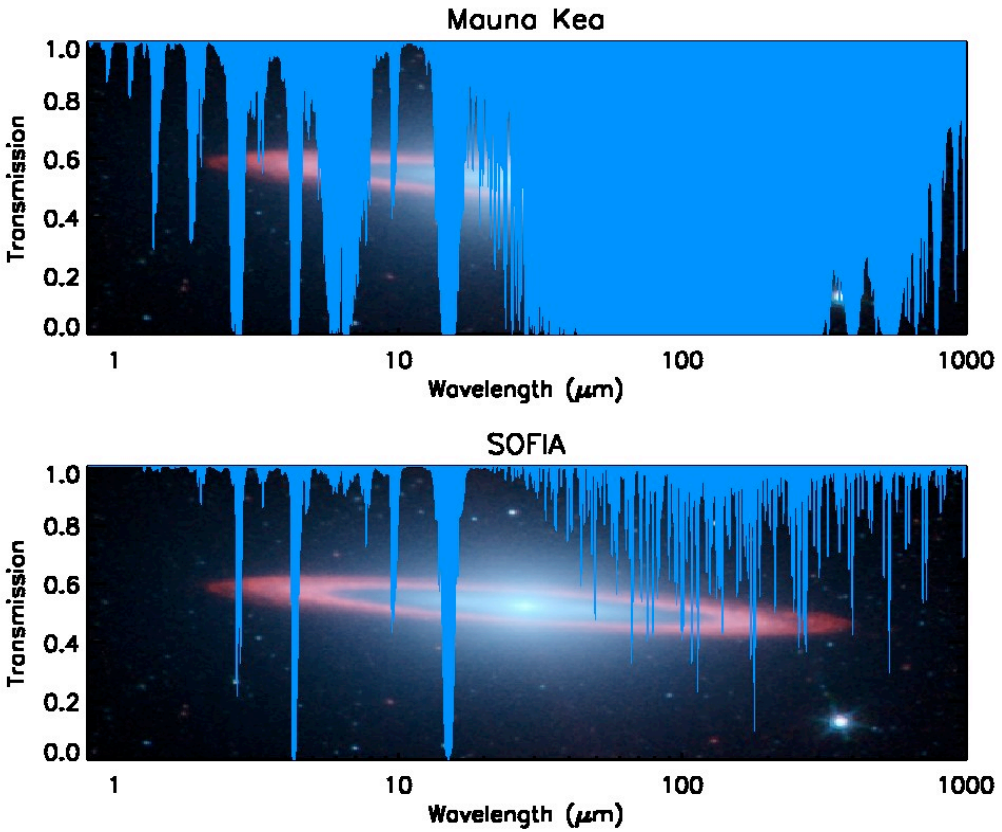
- Operating altitude
  - 39,000 to 45,000 feet (12 to 14 km)
  - Above > 99% of obscuring water vapor
- World Wide Deployments
- Ramp up to ~1000 science hours per year
- Build on KAO Heritage with improvements (Facility Inst., Science Support)
- Science flights to originate from Palmdale ….Aircraft operation by NASA Dryden Research Center (DFRC)
- Science Center is located at NASA Ames Research Center

SOFIA — The Observatory



Why SOFIA?

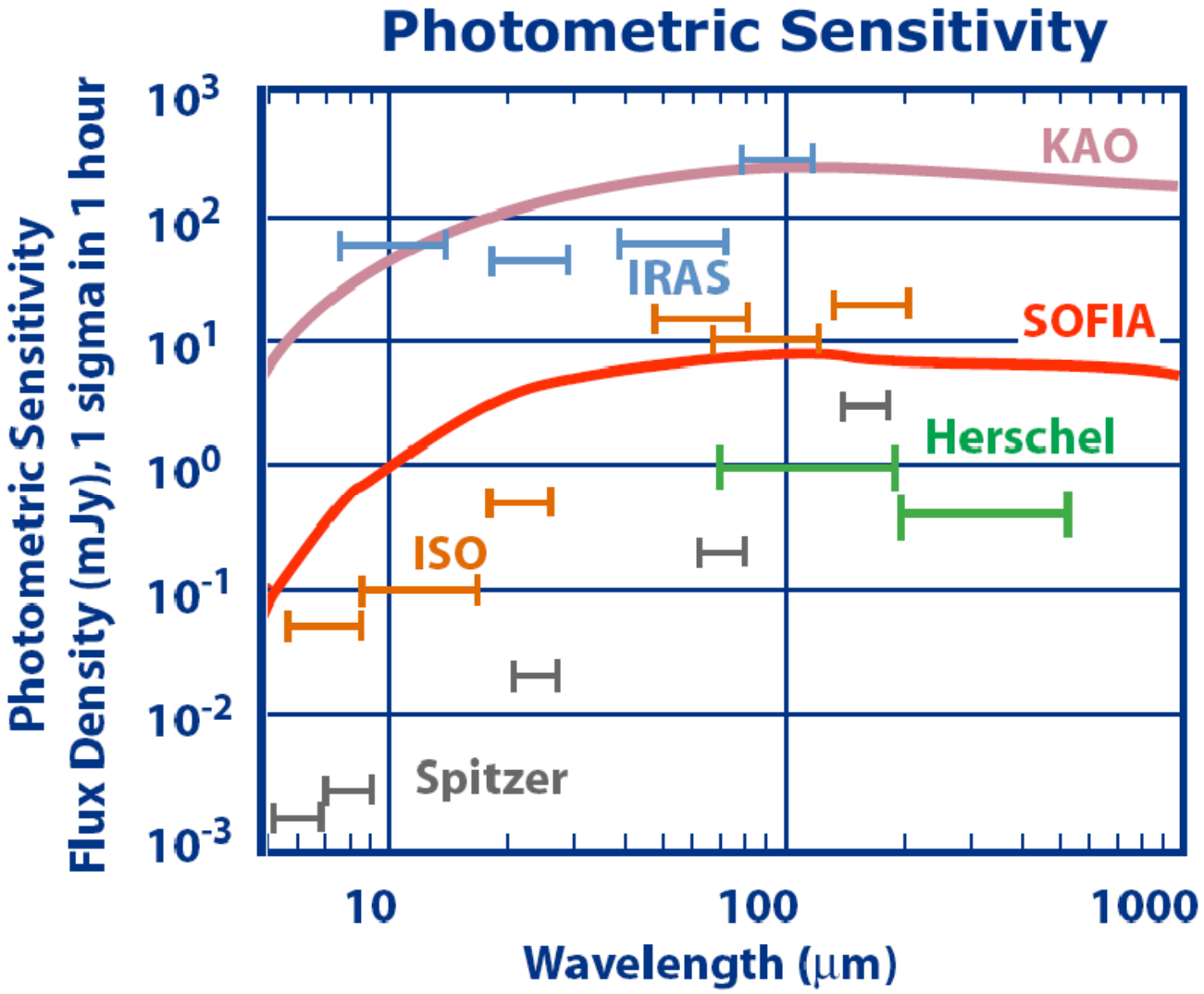
- Infrared transmission in the Stratosphere very good: >80% from 1 to 1000 microns
- Instrumentation: wide complement, rapidly interchangeable, state-of-the art
- Mobility: anywhere, anytime
- Long lifetime



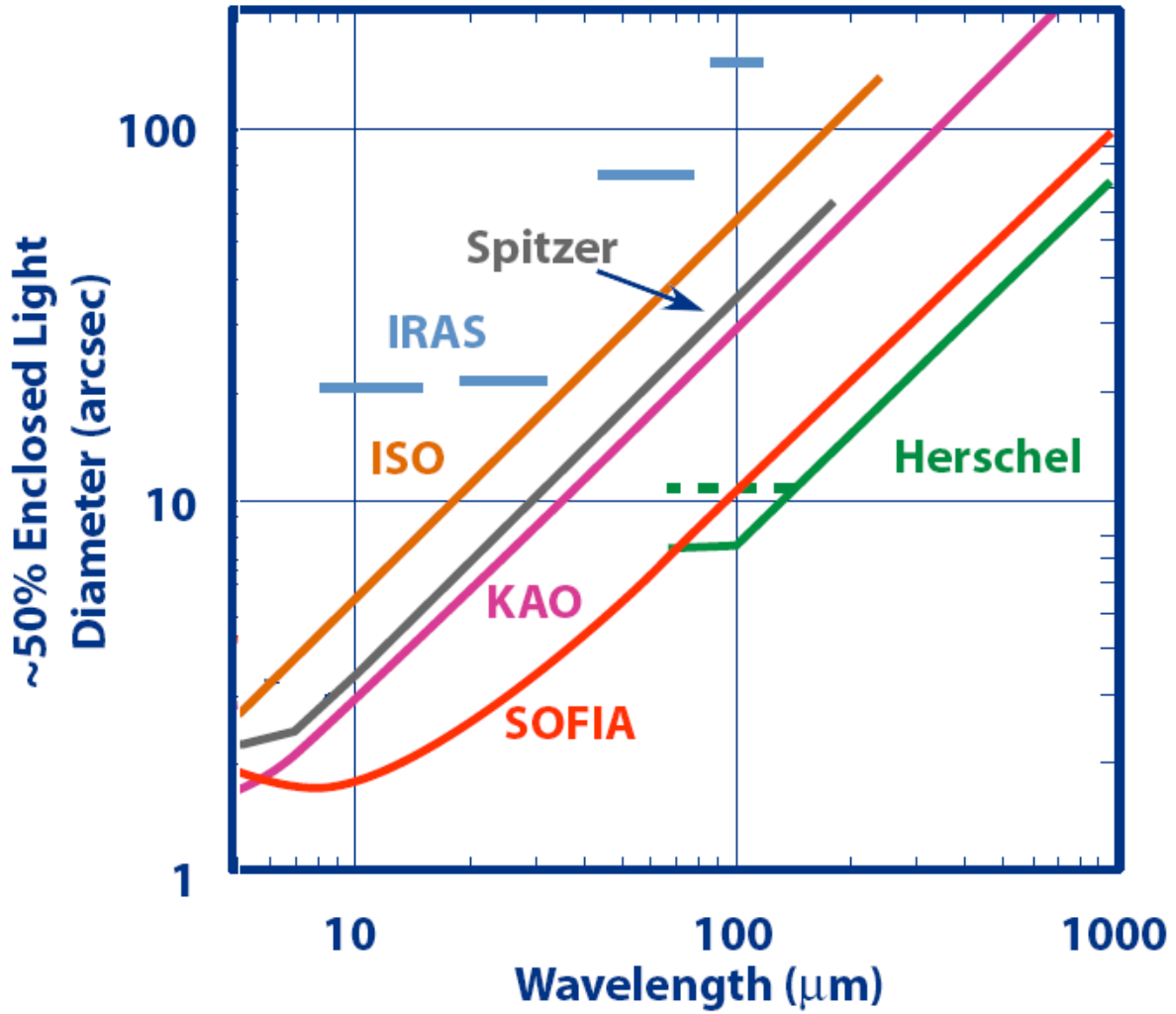
SCIENCE CAPABILITIES

Science Capabilities

- Because of large aperture and better detectors, sensitivity for imaging and spectroscopy similar to the space observatory ISO but with higher spectral and angular resolution.
- 8x8 arcmin Field of View allows use of very large detector arrays
- Image size is diffraction-limited beyond 25 μm, making it 3 times sharper than the space observatory Spitzer at these wavelengths


Photometric Sensitivity
Photometric Sensitivity
Flux Density (mJy), 1 sigma in 1 hour
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
KAO
IRAS
SOFIA
Herschel
ISO
Spitzer
10
100
1000
Wavelength (μm)

Angular Resolution



Other Science Capabilities

- Primary Mirror diameter 2.7 meters. Use the central 2.5 meters.
- Secondary Chopper: 8 arcmin peak to peak, f~20Hz
- Background: ε~0.1, T~240K
- Telescope elevation range is 20 to 60 degrees
- Instruments are accessible

Summary

- Program making progress!
  Science in Summer 2009
- SOFIA will be one of the primary facilities for far-IR and sub-millimeter astronomy for many years